

PCTWORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : C25D 3/54, 5/50, G11B 5/33, H01L 43/02		A1	(11) International Publication Number: WO 00/37715
			(43) International Publication Date: 29 June 2000 (29.06.00)
(21) International Application Number: PCT/US99/27237		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).	
(22) International Filing Date: 18 November 1999 (18.11.99)		Published With international search report.	
(30) Priority Data: 60/108,985 18 November 1998 (18.11.98) US 60/125,618 22 March 1999 (22.03.99) US			
(71) Applicant (for all designated States except US): THE JOHNS HOPKINS UNIVERSITY [US/US]; 708 N. Wyman Park Center, 3400 North Charles Street, Baltimore, MD 21218-2695 (US).			
(72) Inventors; and (75) Inventors/Applicants (for US only): YANG, Fengyuan [CN/US]; Apartment 1R, 2922 North Calvert Street, Baltimore, MD 21218 (US). LIU, Kai [CN/US]; One East University Parkway, Unit 207, Baltimore, MD 21218 (US). CHIEN, Chia-Ling [US/US]; 1536 Pickett Road, Lutherville, MD 21093 (US). SHARSON, Peter, C. [GB/US]; 2216 Wiltonwood Road, Stevenson, MD 21153 (US).			
(74) Agent: OLIVER, Eric; Dickstein Shapiro Morin & Oshinsky LLP, 2101 L Street, N.W., Washington, DC 20037-1526 (US).			
(54) Title: BISMUTH THIN FILM STRUCTURE AND METHOD OF CONSTRUCTION			
(57) Abstract			
<p>The invention is directed to the use of electrochemical deposition to fabricate thin films of a material (e.g., bismuth) exhibiting a superior magnetoresistive effect. The process in accordance with a preferred embodiment produces a thin film of bismuth with reduced polycrystallization and allows for the production of single crystalline thin films. Fabrication of a bismuth thin film in accordance with a preferred embodiment of the invention includes deposition of a bismuth layer (120) onto a substrate (200) with a metallic underlayer (118) using electrochemical deposition under relatively constant current density. Preferably, the resulting product is subsequently exposed to an annealing stage for the formation of single crystal bismuth thin film. The inclusion of these two stages in the process produces a thin film exhibiting superior MR with a simple field dependence in the process suitable for a variety of field sensing applications.</p>			